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AUTOMATIC PURGE DETECTION AND PUMP SELF-PRIME TROUBLESHOOT THROUGH AIR DETECTION BY IMPEDANCE READING

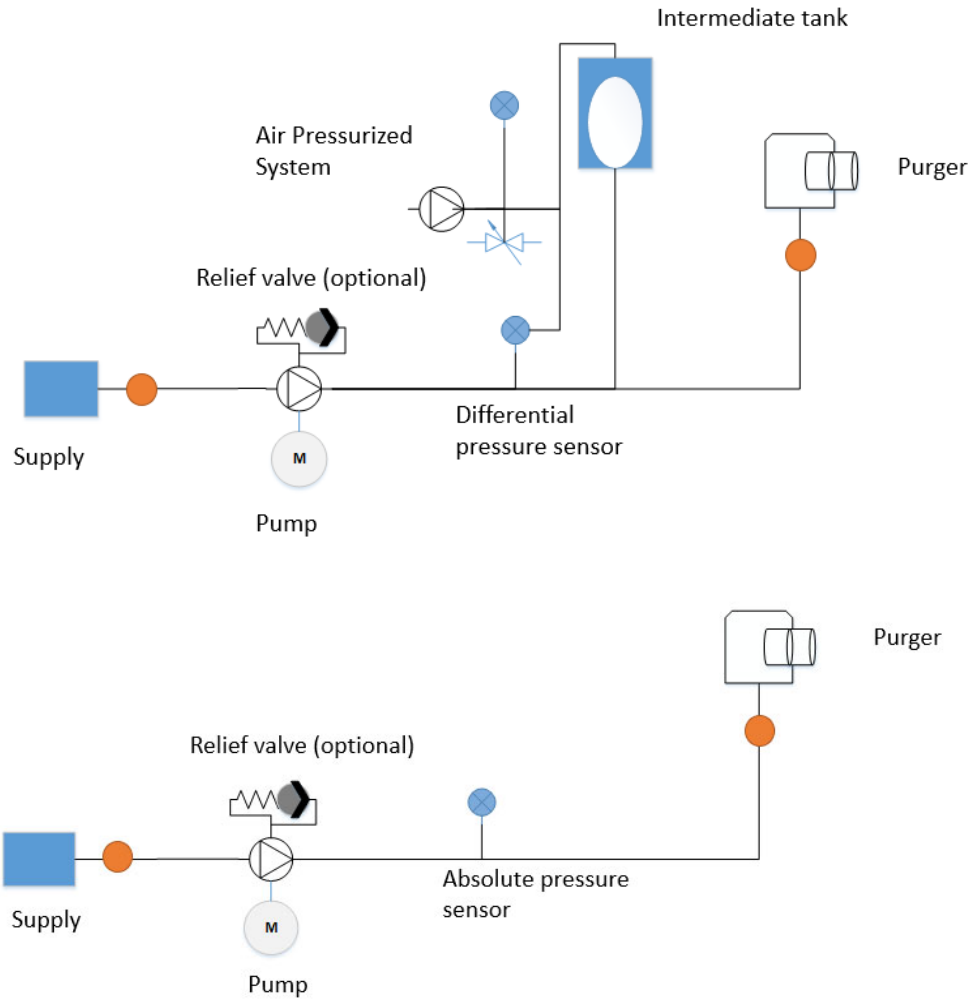
HP INC

Automatic purge detection and pump self-prime troubleshoot through air detection by impedance reading

This describes a procedure to use a sensor that detects air inside the tubes with impedance reading to detect if the purge has been completed successfully or there is remining air inside the IDS.

This describes a procedure to detect if the purge has been completed successfully or not by using an air in tubes sensor.

This sensor shown in orange color should be placed in both extreme points of the IDS system as shown below in both Hot Swap Systems and Cold Swap Systems:



Typically, by using the sensors you can have 4 possible cases:

- **Ink not detected in any sensor:** There is a problem in the purge, maybe related to pump self-prime process, or maybe because there is no purger inserted correctly. Troubleshooting allowed by this sensor disposition.
- **Ink detected in the first sensor and not in the second:** There is so much air inside the tubes, purge no completed successfully. Possible blockage in the ink line.
- **Ink detected in the second sensor and not in the first one:** There is a problem with one of the sensors. Troubleshooting allowed with this sensor disposition to detect which one is the one not working.
- **Ink detected in both** sensors: If the ink reached both sensors in a specific period (to be characterized for each project) the printer has been purged correctly and can be set as purged. If not, there could be some remaining air inside the tubes.

From the metrics obtained, troubleshoot from the ink pump can be performed. If pump has self-prime problems, printer can automatically launch recovery routines on the pump to be able to prime the line without any assistance. If it fails as well, it can repot the error to the customer to perform the prime manually or call the service support.

Also, by calculating the time between the two flags (detections from impedance sensors), flowrate from the pump can be calculated. Thus, through this procedure we can diagnose if the pumps are performing well even if the ink line has been purged.

There are a lot of advantages of being able to troubleshoot the purge with this implementation. The main ones are:

- Removes customer dependency, avoiding issues of air ingestion from the printheads due to incorrect purge.
- Allows to automatically detect and troubleshoot problems from ink pump self-prime and flowrate.
- Avoids cost to customer and HP by preventing warranty failures or early failure from printheads.
- Avoiding overpressure in the ink system, especially during the first moments of the printer working. That avoids system overstress and premature broken components.
- Customer experience would be improved by reducing interaction during purge process, making it “more intelligent”.
- Avoids ink spills at removing purgers due to less remanent pressure in the ink system.
- Customer experience would also be improved by reducing purge process time.

- Enabling end purge process detection allows tracking purges with more confidence from a Big Data point of view.
- Can be used to track, evaluate, and troubleshoot purge problems during installation
- Allows to run automatic recovering routines on the pump to avoid self-prime issues, reducing the UIR.
- It is a flexible solution, that does not depend on the program. It can be used in all Cold Swaps programs.

Disclosed by Oscar Gomez, Cristian Diez and David Butinya, HP Inc.